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EXAMINER

ALCALA, JOSE H

ART UNIT PAPER NUMBER

2827

DATE MAILED: 12/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/651,334

Applicant(s)

BAILEY ET AL.

Examiner

Jose H Alcala

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 20-29 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-12, 20, 21 and 23-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-3,5-12, 20-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 20 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: where exactly is the conductive pad located in relation to the hole, to the insulating layer and to the conducting layer. In addition the recitation: "a majority thereof within an area defined by an outer periphery of the hole" is vague, and is not sufficient to clearly establish the structural cooperative relationship of the elements of the circuit board.

Regarding claims 6, it is not clear if the conductive layer is either a signal layer or a ground layer that is close to a signal layer. The label: "signal ground layer", is unclear describing the layer, since the terms: "signal" and "ground" are commonly used in the art for two different kinds of layers. It is suggested to be changed to "ground layer" to avoid any vagueness problems.

Regarding Claims 20 and 25, the recitation "signal ground layer" is vague; it is not clear if the layer is either a signal layer or a ground layer that is close to a signal layer. The label: "signal ground layer", is unclear describing the layer, since the terms: "signal" and "ground" are commonly used in the art for two different kinds of layers. It is suggested to be changed to "ground layer" to avoid any vagueness problems.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1,6-8,12 are rejected under 35 U.S.C. 102(e) as being anticipated by Mc Mahon (US Patent No. 6,075,712). As best understood by the examiner:

Regarding claim 1, McMahon teaches a surface laminar circuit board, comprising: an insulating layer (column 2, line 52); a conductive layer (Reference

number 208) disposed on an upper surface of said insulating layer, said conductive layer having a hole formed therein (the space between any two conductors of Reference number 208); a dielectric layer disposed on an upper surface of the conductive layer (the section of dielectric material on top of reference number 208); and a conductive pad (reference number 206) having a majority thereof within an area defined by an outer periphery of the hole, said conductive pad being for receiving a surface mounted component (reference 560) thereon.

Regarding Claim 6, McMahon teaches that said conductive layer (reference number 208) comprises a signal ground layer (column 3, lines 64-65).

Regarding Claim 7, McMahon teaches that said signal ground layer is comprised of copper (column, lines 48-50).

Regarding claim 8, the limitation that the hole is formed by etching is a product by process limitation. If the product in the product-by-process claims are the same as or obvious from a product of the prior art, the claims are unpatentable even though the prior product was made by a different process. See *In re Thorpe*, 227 USPQ 964,966 (Fed.Cir 1985). A "product by process" claim is directed to the product per se, no matter how actually made, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious

product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

Regarding Claim 12, McMahon teaches that said conductive pad (reference number 206) is disposed completely within the area defined by the outer periphery of the hole. See figure 5A.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 2-3,9-11,20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mc Mahon (US Patent No. 6,075,712) in view of Trask et al. (US Patent No. 5,034,091). As best understood by the examiner:

Regarding Claim 2, McMahon teaches all the limitations of the instant claimed invention as stated supra for claim 1, but fails to teach said dielectric layer is a photosensitive dielectric layer. Trask teaches a circuit board having a photosensitive dielectric layer (reference number 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of McMahon and in order to have a photosensitive dielectric layer, thus providing a stable and easy to

accommodate base for a metal coated via, and making the circuit board easily adaptable to vertical stacking in order to save space and improve integration.

Regarding Claim 3, McMahon as modified by Trask teaches that said photosensitive dielectric layer is in direct contact with the insulating layer by way of the hole (See the dielectric material inside the hole in McMahon figure 5A), and that said conductive pad is disposed directly on an upper surface of said photosensitive dielectric layer (See figure 5a of McMahon), and that the dielectric layer is separating said conductive pad from said conductive layer and from said insulating layer.

Regarding Claim 9, McMahon as modified by Trask teaches that said photosensitive dielectric layer has a thickness (it is inherent to the device), in a region over the conductive layer, but fails to explicitly teach that the thickness is less than about 50 micrometers. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the thickness less than about 50 micrometers in order to improve integration and reduce the use of material. In addition since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. See *In re Aller*, 105 USPQ 233.

Regarding Claim 10, McMahon as modified by Trask teaches that said photosensitive dielectric layer has a thickness, (it is inherent to the device), in a region over the conductive layer, but fail to explicitly teach that the thickness is equal to or less than about 40 micrometers. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the thickness equal to or less than about 40 micrometers in order to improve integration and reduce the use of material, since it has

been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 11, McMahon as modified by Trask teaches signal traces (reference number 260) disposed directly on said photosensitive dielectric layer.

Regarding Claim 20, McMahon teaches a surface laminar circuit board, comprising: an insulating layer (column 2, line 52); a signal ground conductive layer (Reference number 262); disposed on an upper surface of said insulating layer, said conductive layer having a hole (the space between any two conductors of Reference number 262) formed therein; a dielectric layer (the section of dielectric material on top of reference number 262) disposed on an upper surface of the signal ground conductive layer, said dielectric layer having a micro via (reference numbers 264) formed therein; a signal trace (reference number 260) disposed on said photosensitive dielectric layer, and being electrically coupled with said signal ground conductive layer by way of said micro-via (See figure 2B) ; a conductive pad (Reference number 206) having a majority thereof within an area defined by an outer periphery of the hole, and being electrically coupled with said signal trace; and a surface mounted component (reference number 204) mounted on said conductive pad. McMahon fails to explicitly teach that the dielectric layer is photosensitive and that the micro-via is a photo micro-via.

Trask teaches a circuit board having a photosensitive dielectric layer (reference number 8) and having a photo micro-via (reference number 26). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine

the teachings of McMahon and in order to have a photosensitive dielectric layer, thus providing a stable and easy to accommodate base for a metal coated via, and making the circuit board easily adaptable to vertical stacking in order to save space and improve integration.

Regarding claim 21, McMahon as modified by Trask teaches that said photosensitive dielectric layer is in direct contact with the insulating layer by way of the hole (see arrangement of McMahon in figure 2A), and wherein said conductive pad is disposed directly on an upper surface of said photosensitive dielectric layer (See McMahon figure 2A) separating said conductive pad from said conductive layer and from said insulating layer.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over McMahon (US Patent No. 6,075,712) in view of Trask et al. (US Patent No. 5,034,091), and further in view of Higgins, Jr. (US Patent No. 5,034,091). As best understood by the examiner:

Regarding Claim 5, McMahon as modified by Trask teaches all the limitations of the instant claimed invention as stated supra for claim 1, but fails to explicitly teach that said insulating layer is an FR4 insulating layer. Higgins, Jr. teaches a dielectric layer made of an FR4 material. It would have been obvious to one having ordinary skill in the art at the time the invention was made, to make said insulating layer an FR4 insulating layer, in order to attenuate any unwanted radio frequency signals. In addition it has been held to be within the general skill of a worker in the art to select a known material

on the basis of its suitability for the intended use as a matter of obvious design choice.

In re Leshin, 125 USPQ 416.

8. Claims 23-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mc Mahon (US Patent No. 6,075,712) in view of Snodgrass et al. (US Patent No. 5,311,406).

Regarding Claim 23, McMahon teaches a surface laminar circuit board, comprising: an insulating layer (column 2, line 52); a conductive layer (Reference number 262) disposed on an upper surface of said insulating layer, said conductive layer having a hole (the space between any two conductors of Reference number 262) formed therein; a dielectric layer (the section of dielectric material on top of reference number 262) disposed on an upper surface of said conductive material; and a conductive pad (Reference number 206) having a major portion thereof disposed directly over the portion of said insulating layer exposed by the hole, said conductive pad being for receiving a surface mounted component (reference number 204) thereon.

McMahon fails to explicitly teach that the conductive material is disposed in form of a sheet, the hole exposing a portion of said insulating layer, the sheet of conductive material completely surrounding an area defined by the hole, the area being in registration with, and corresponding in shape and size, to the portion of said insulating layer exposed by the hole.

Snodgrass teaches a circuit board (reference number 500) comprising a sheet of conductive material (Reference number 30), having a hole located over an insulating

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layer exposing a portion of it, the sheet of conductive material completely surrounding an area defined by the hole, the area being in registration with, and corresponding in shape and size, to the portion of said insulating layer exposed by the hole. (Column 3, lines 19-21). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of McMahon and Snodgrass in order to have a sheet of conductive material, having a hole located over an insulating layer exposing a portion of it, the sheet of conductive material completely surrounding an area defined by the hole, the area being in registration with, and corresponding in shape and size, to the portion of said insulating layer exposed by the hole. Thus, providing rigidity and firmness to the circuit board, making the board be easier to manufacture, reducing costs.

Regarding claim 24, McMahon as modified by Snodgrass teaches that said dielectric layer is in direct contact with the portion of said insulating layer exposed by the hole (see arrangement of McMahon in figure 2A), and wherein said conductive pad is disposed in direct contact with an upper surface of said dielectric layer, said dielectric layer separating said conductive pad from said conductive material and from said insulating layer. See McMahon figure 2A

Regarding claim 25, McMahon as modified by Snodgrass said conductive material comprises a signal ground layer (see Snodgrass column 3, lines 41-43).

Regarding Claim 26, McMahon as modified by Snodgrass teaches that said dielectric layer has a thickness (it is inherent to the device), in a region over the conductive layer, but fails to explicitly teach that the thickness is less than about 50

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micrometers. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the thickness less than about 50 micrometers in order to improve integration and reduce the use of material. In addition since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. See *In re Aller*, 105 USPQ 233.

Regarding Claim 27, McMahon as modified by Snodgrass teaches that said dielectric layer has a thickness, (it is inherent to the device), in a region over the conductive layer, but fail to explicitly teach that the thickness is equal to or less than about 40 micrometers. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the thickness equal to or less than about 40 micrometers in order to improve integration and reduce the use of material, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In *re Aller*, 105 USPQ 233.

Regarding Claim 28, McMahon as modified by Snodgrass teaches that all of said conductive pad is disposed over the portion of said insulating layer exposed by the hole (See McMahon Figure 2B).

Regarding Claim 29, McMahon as modified by Snodgrass that all of said conductive pad is disposed over the portion of said insulating layer exposed by the hole. (See McMahon Figure 2B).

Response to Arguments

9. Applicant's arguments filed 7/25/02 with respect to the 35 USC §112 rejection, have been fully considered but they are not persuasive. Applicant argues that the features which are not mentioned in the claims, are not essential to the invention, therefore the rejection is not proper. Examiner respectfully disagrees and points out that the rejection is not made because any missing element, but because the relationship between these elements is not clear. The rejection is still proper.

10. Applicant further argues that applicant's specification clearly defines what is meant by: "a majority thereof within an area defined by an outer periphery of the hole", in page 11, lines 1-5. Examiner acknowledges that the meaning of the phrase is clearly defined in the specification, but points out in that the claims by themselves need to be clear enough in order to completely describe the invention. The rejection is still proper.

11. Applicant further argues that applicant's specification defines what is meant by: "a signal ground layer", in page 10, lines 5-9. Examiner acknowledges that the Specification uses the label: "a signal ground layer" for the conductive layer, but points out that the label is unclear, since the terms: "signal" and "ground" are commonly used in the art for two different kinds of layers. It is suggested to be changed to "ground layer" to avoid any vagueness problems. The rejection is still proper.

12. Applicant's arguments with respect to the art rejection of claims 1-3,5-12,20-21,23-29 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references show some of the elements of the instant claimed invention: Alpaugh et al. (US Patent No. 5,418,689), Oritsuky et al. (US Patent No. 4,426,548), Small, Jr. (US Patent No. 4,554,229) and DiStefano et al. (US Patent No. 6,365,975).

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose H Alcala whose telephone number is (703) 305-9844. The examiner can normally be reached on Monday to Friday.

15. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703) 305-3431 for After Final communications.

16. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JHA
November 29, 2002


ALBERT W. PALADINI
PRIMARY EXAMINER